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### 20-2.01 Computer Estimates

The Department uses two computer programs to help develop and track cost estimates - Cost Estimating System (CES) and Info Tech's "Estimator." CES is used internally by INDOT until the final estimate to develop preliminary cost estimates. CES is located on the Department's internal computer network system. It should be noted that CES can be imported into Estimator.

Estimator is used by consultants to determine the preliminary cost estimate. Estimator is also used by the Department's in-house and District designers. Estimator is a Microsoft Windows based program.

Each program has detailed user guide manuals that the designer should review before using the program. These manuals can be obtained from the Contract Services Section or by contacting the TRNS • PORT (BAMS) Administrator in the Information Services Division.

In order to better estimate construction costs in the future and to analyze work done in the past, more information must be entered into CES for an in-house-designed project, or into Figure 20-2A, Consultant Project Input Form, for a consultant-designed project. The additional information to be required is as follows:

1. Latitude and Longitude. This information should be taken from the SPMS project schedule. If it is not shown there, the designer or estimator should determine the location of the midpoint of the project in degrees, minutes, and seconds. However, the units symbols should be omitted. For example, 89° 59' 34'' would be entered as 895934. For an in-house design, this information is entered on the second page of the General tab. For a consultant design, this information is entered on the right-hand side of the Consultant Project Input Form.

For a contract that includes work on more than one route, e.g., guardrail repair, traffic signal bulb replacement, mowing, herbicide treatment, etc., the latitude and longitude of the point closest to the geographic center of all work should be entered.

2. Project Length, Pavement Width and Depth, and Lane Kilometers. For an in-house design, this information should be entered on the first page of the General tab at the bottom left of the page in the block titled Metrics. For a consultant design, the values, excluding units, are entered on the left-hand side of the Consultant Project Input Form.

- a. The project length unit is kilometer.

- b. The pavement width is the total for the new pavement work, including paved shoulders, being done. The unit is meter. The pavement depth is the average for the new pavement work, including paved shoulders, being done. The unit is millimeter.
- c. Lane kilometers is the project length times the number of travel lanes of pavement work, excluding shoulders. The unit is kilometer.

Cost estimates are typically based on the quantities and applicable unit prices. CES allows the designer to enter both quantities and/or to develop cost estimates based on general estimating procedures (e.g., cost per square meter of bridge deck, cost per intersection). For Estimator, the user must input actual quantities into the program before it can generate a cost estimate. Once the quantities have been entered, the programs will automatically provide a cost estimate based on historical data from past bids. The Department is responsible for providing the base information used by the programs. This estimate may be used as is. However, the designer should review the unit costs. Based on the proposed scope for the project, the designer should be aware of factors that may influence unit prices as follows:

1. geographic location (e.g., urban/rural, State location, district);
2. similarity of recent construction projects;
3. inflation (adjustments of past prices to reflect the current year);
4. reliability of recent construction cost data;
5. recent trends in cost of materials, labor and equipment;
6. anticipated difficulty of construction;
7. project size relative to size of similar projects;
8. proposed project schedule;
9. anticipated construction staging;
10. expected environmental problems (e.g., hazardous wastes, wetlands);
11. use of experimental materials, requires coordination with the Research Division; and
12. engineering judgment.

## **20-2.02 Coded Pay Items**

### **20-2.02(01) General**

Each pay item has an official title and code number which is tied to the *Standard Specifications*. These items are listed in the INDOT *Catalog of Unit Price Averages for Roads - Bridges - Traffic*. This document can be obtained from the Contract Services Section. These item numbers are used by the Department for tracking and as a historic data base. For most items, CES or Estimator will provide the official pay item number. However, for some specialty or new items, the construction item may not be within the computer. Therefore, the designer will be required to conduct the following.

1. Checking. The designer should ensure that there is an actual number for the item within the system by entering the item into CES or Estimator. Do not assume the item is not in the system.
2. Specifications. The designer should review the *Standard Specifications*, Supplemental Specifications or Recurring Special Provisions to determine if there is a method of payment for the item. If not, a special provision must be developed; see Section 19-2.0.

The designer should be certain that the CES or Estimator software's pay items catalog to be used in developing the estimate of quantities and cost estimate corresponds to that which is effective for the contract letting date. Pay item names, pay units, or code numbers are periodically revised, added, or deleted. It is the designer's responsibility to check the estimating software when these changes occur, and to be certain that they are reflected in the estimate of quantities and cost estimate throughout project development.

### **20-2.02(02) New Pay Items and Code Numbers**

If an item does not exist within the computer (CES or Estimator), the designer may request the Contract Services Section to develop a new pay item and code number. It is important for the designer to minimize this option as much as practical. It is preferred that the design be modified slightly in order to use an existing pay item. Where necessary, use the following procedure to request a new pay item and code number.

1. Request. Send or fax a memorandum requesting the new pay item to the Contract Services Section. This memorandum should include the information as follows:

- a. the proposed pay item name;
  - b. the pay unit, both English and metric;
  - c. the applicable *Standard Specifications* section reference;
  - d. 3 copies of the special provision for the item, double spaced; and
  - e. where applicable, plan details.
2. Comments. The Contract Services Section will review the request and may solicit comments from other Department units or sections. The written request for comments will include the information as follows:
  - a. the *Standard Specifications* section number;
  - b. a copy of the special provision;
  - c. plan details, where applicable; and
  - d. the Contract Services Section's comments on the request.

Those solicited for comments will be given five working days to return their comments.

3. Response. Upon receipt of all comments, the Contract Services Section will either approve the new pay item for use and assign it a new pay item code number, or it will recommend the use of an existing pay item by developing a supplemental description for an existing specification.

### **20-2.02(03) Bridge Identification in Pay Item Names**

A unique identifier should be assigned to each distinct bridge in the contract when required in pay item names. For a set of twin structures, each bridge should therefore be assigned a unique identifier.

### **20-2.03 Estimating Guidelines**

For most items, CES and Estimator will provide the designer with sufficient guidance in determining the appropriate cost for a specific item. However, the designer should consider the following.

1. Unit Costs. The unit cost for most work items will be based upon an average price data base maintained by the Department within CES and Estimator, price books and unit cost

bid tabulations. Adjustments to these unit prices may be appropriate based on the factors listed in Section 20-2.01.

2. Lump-Sum Items. Desirably, lump-sum items should not be used on a project. However, this is not always practical. Where necessary, only use lump-sum bid items where the scope of work for the item is clearly defined and the amount of work has a minimal chance of changing during construction. In determining the unit price for lump-sum items, the designer should consider the following.
  - a. Components. Most lump-sum items can be divided into individual parts for estimating purposes. For example, temporary traffic signal structures can be divided into the pole installation, signal heads, controller, installation, maintenance, removal, etc. Once the elements have been segregated, the designer should use engineering judgment to determine the appropriate cost for each component.
  - b. Percentages. Some lump-sum items are determined based on a percentage of the total of the contract items (e.g., mobilization and demobilization, clearing right-of-way). These are further discussed below.
3. Clearing Right-of-Way. Clearing right-of-way is typically assumed to be 1 to 2 percent of the contract items. Factors that should be considered include project location, rural or urban, the type of clearing required (trees or brush), concentration of clearing and method of disposal.
4. Temporary Bridges and Approaches. Temporary bridges and approaches should be segregated into the various components as discussed in Item 2.a. For example, temporary approaches should be determined according to the amount of embankment required, width of pavement, drainage systems, etc. Note that temporary guardrail and temporary pavement markings will be paid for separately.
1. Miscellaneous Items. The following pay items should always be included in the cost estimate.
  - a. Field Office. The field office is paid for by the month. The number of months used for final quantity and schedule of pay items is set by District Construction based on the estimated construction time.

- b. Maintaining Traffic. Maintaining traffic is a lump-sum item and will be determined based on its various components. Elements that should be considered include traffic volumes, traffic composition, peak times, number of lanes, length of construction and type of work.
- c. Construction Engineering. This will typically be determined by the computer. In general, construction engineering is determined using 2 percent of the total of the contract items. This may need to be revised if significant engineering may be required during construction.